



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

58249 7590 09/15/2011
COOLEY LLP
ATTN: Patent Group
Suite 1100
777 - 6th Street, NW
WASHINGTON, DC 20001

EXAMINER

YUAN, DAH WEI D

ART UNIT

PAPER NUMBER

1717

DATE MAILED: 09/15/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

08/471,890

06/07/1995

DONALD R. HUFFMAN

MIT-003/05US
308622-2007

9010

TITLE OF INVENTION: FORM OF CARBON

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
-------------	--------------	---------------	---------------------	----------------------	------------------	----------

nonprovisional

YES

\$755

\$0

\$0

\$755

12/15/2011

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

58249 7590 09/15/2011
COOLEY LLP
ATTN: Patent Group
Suite 1100
777 - 6th Street, NW
WASHINGTON, DC 20001

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

08/471,890 06/07/1995 DONALD R. HUFFMAN MITS-003/05US 9010

308622-2007

TITLE OF INVENTION: FORM OF CARBON

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
-------------	--------------	---------------	---------------------	----------------------	------------------	----------

nonprovisional YES \$755 \$0 \$0 \$755 12/15/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
----------	----------	----------------

YUAN, DAH WEI D 1717 423-44500B

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/471,890	06/07/1995	DONALD R. HUFFMAN	MITS-003/05US 308622-2007	9010
58249	7590	09/15/2011	EXAMINER	
COOLEY LLP			YUAN, DAH WEI D	
ATTN: Patent Group				
Suite 1100			ART UNIT	
777 - 6th Street, NW			PAPER NUMBER	
WASHINGTON, DC 20001			1717	
DATE MAILED: 09/15/2011				

Determination of Patent Term Extension or Adjustment under 35 U.S.C. 154 (b) (application filed prior to June 8, 1995)

This patent application was filed prior to June 8, 1995, thus no Patent Term Extension or Adjustment applies.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No.	Applicant(s)	
	08/471,890	HUFFMAN ET AL.	
	Examiner	Art Unit	
	DAH-WEI YUAN	1717	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on July 22, 2011.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 122-124,126,127,130,131,133-151 and 153-165.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date ____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other ____. |

Examiner: Yuan S.N. 08/471,890 Art Unit: 1717

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

ABSTRACT

Please add the following abstract:

C₆₀ and C₇₀ carbon atom compounds are prepared by evaporating graphite in an inert quenching gas. The vapor of carbon is collected and is selectively extracted with an organic non-polar solvent.

A copy of this abstract is shown on the last page of this document.

Reason for the examiner's amendment

The applicant has not filed an abstract in the instant application as indicated on page 2 of the transmittal letter filed on June 7, 1995. The letter states on page 1 that the attached papers are a true copy of what is shown in the records in the prior application 07/580,246. However, the transmittal letter does not indicate that an abstract was filed and no abstract has been made of record in the instant application. Therefore, the examiner's amendment inserts the abstract from prior application 07/580,246.

Reasons for Allowance

Claims 122-124, 126, 127, 130, 131, 133-151 and 153-165 are allowed.

With respect to claims 122, 123, 126, 133-151, and 153-163, the closest prior art of record, Kappler et al., and Lefevre et al., both do not disclose, teach, or suggest purified C₆₀ or purified C₇₀, which would read on purified cage molecules consisting of carbon atoms. Kappler et al. (J. Appl. Phys. 50 (1), 1979, pp.308-316) and Lefevre ("Investigation of Iron and Carbon Dusts," Annales D' Astrophysique, vol. 30, no. 4, pp. 731-738, 1967), both disclose the method of producing cage molecules consisting of carbon atoms (with C₆₀ and C₇₀ inherently disclosed in the references reading on this genus of cage molecules consisting of carbon atoms) but do not disclose, teach, or suggest isolating or purifying C₆₀ or C₇₀ to any degree from the sooty carbon product. After further consideration by the examiner, the Fang et al. and Osawa et al. references applied in the June 23, 2010 final Office action do not provide a preponderance of evidence of the existence of C₆₀ and C₇₀ in nature in view of evidence to the contrary, which will be discussed below.

With respect to claims 124, 130, and 131, the closest prior art of record, Kappler et al., and Lefevre et al., both do not disclose, teach, or suggest crystalline C₆₀ or C₇₀, which would read on crystalline cage molecules consisting of carbon atoms or cage molecules consisting of carbon atoms in crystalline form.

With respect to claim 127, the C₆₀ and C₇₀ inherently present in the sooty carbon product (which can be interpreted as a formed product) in Kappler et al. and Lefevre et al. are not purified, and therefore would not read on the claim. A formed product or molded product as recited in claim 127 is interpreted as an article of manufacture in view

Art Unit: 1717

of the instant specification (see page 15). Claim 127 recites “[a] formed or molded product comprising purified C₆₀ and/or C₇₀.” A formed or molded product comprising purified C₆₀ and/or C₇₀ as recited in claim 127 does not contain the impurities that are inherently associated with C₆₀ and/or C₇₀.

With respect to claims 164 and 165, the prior art does not disclose, teach, or suggest an industrial paint pigment or a lubricant comprising C₆₀ and/or C₇₀.

The meaning of the claim term “cage molecules consisting of carbon atoms”

As explained in the advisory action mailed on 10/21/2010 in the instant application, the limitation “cage molecules consisting of carbon atoms” recited in the claims **does not encompass carbon nanotubes**. The relevant portions of that advisory action are reiterated immediately below.

As discussed in Kroto's 1991 journal article (Kroto et al., “C₆₀: Buckminsterfullerene,” Chem. Rev. 91 (1991), pp. 1213-1235), which was submitted as an attachment to his declaration dated 27 August 2007 and filed on September 7, 2007 in the instant application, “fullerene” was understood by one of ordinary skill in the art at the time of filing to be the family of cage molecules consisting of carbon atoms (also called spherical fullerenes today as evidenced by the literature articles discussed below). The C₆₀ and C₇₀ molecules produced and isolated by applicants are inherently soluble in nonpolar organic solvents, which is a common characteristic shared by the spherical fullerenes – namely, the cage carbon molecules consisting of carbon atoms. Other examples of spherical fullerenes that can be produced and extracted using applicant's disclosed method in the instant application are evidenced by the declaration

Art Unit: 1717

of Dr. Adam Darwish filed on September 7, 2007 in the instant application. Dr. Darwish provided evidence that he was able to prepare and isolate C_{60} , C_{70} , C_{76} , C_{84} , C_{86} , and C_{90} using the disclosed method in the instant application.

In 1991, carbon nanotubes were discovered and are regarded by one of ordinary skill in the art either as another subgenus of fullerene (called tubular fullerenes today) or as an entirely different class of molecules having different properties from those of the spherical fullerenes (i.e., cage molecules consisting of carbon atoms).

The following literature articles cited below confirm that the limitation "cage molecules consisting of carbon atoms" is regarded today by one of ordinary skill in the art as either (1) a subgenus of fullerene that is distinct from the carbon nanotube subgenus of fullerene or (2) a fullerene that is different from carbon nanotubes, with carbon nanotubes being regarded as a distinct class of molecules consisting of carbon atoms having different properties and a cylindrical or tubular shape.

The following literature articles fall under category (1). These articles regard "cage molecules consisting of carbon atoms" as a subgenus of fullerene that is distinct from the carbon nanotube subgenus of fullerene:

(a) Hu et al., "Bond order bond polarizability model for fullerene cages and nanotubes," J. Chem. Phys., vol. 123, issue 21 (2005), 214708.

(b) "Fullerene." Encyclopaedia Britannica's Guide to the Nobel Prizes. [online], 2010. [retrieved on 2010-09-27]. Retrieved from the Internet: <URL: <http://www.britannica.com/nobelprize/article-9002185>>.

(c) Karthikeyan et al., "Large Scale Synthesis of Carbon Nanotubes," E-Journal of Chemistry, 6(1), pp. 1-12 (2009) [online]. [retrieved on 2010-09-27]. Retrieved from the Internet: <URL: <http://www.e-journals.net>>.

Importantly, Karthikeyan et al. discuss on page 3 that "[w]hen pure graphite rods are used, the anode evaporates to form fullerenes, which are deposited in the form of soot in the chamber. However, a small part of the evaporated anode is deposited on the cathode, which includes CNTs," the CNTs being the abbreviation for carbon nanotubes. This teaching in the reference means that applicants' method disclosed in the instant application does not isolate or purify carbon nanotubes from the sooty carbon product since the carbon nanotubes are deposited on the cathode and are not in the collected sooty carbon product.

The following literature articles fall under category (2). These articles regard "cage molecules consisting of carbon atoms" as a fullerene and carbon nanotubes as a distinct class of carbon material that are different from fullerene:

(a) D.M. Ugarte, "Novel Graphitic Structures: Fullerenes, Nanotubes, and Onions," [online], 1994. [retrieved on 2010-09-27]. Retrieved from the Internet: <URL: http://www.fondationlatsis.org/plpdf/Prix_Latsis/EPFL_1994.pdf>.

(b) M.S. Dresselhaus, "Carbon-Based Nanostructures," [online]1998, WTEC Hyper-Librarian [retrieved on 2010-09-27]. Retrieved from the Internet: <URL: http://www.wtec.org/loyola/nano/us_r_n_d/09_02.htm>.

(c) Wu et al., "Computationally designed families of flat, tubular, and cage molecules assembled with "starbenzene" building blocks through hydrogen-bridge bonds," Chemistry, vol. 16, no. 4 (2010), pp. 1271-80.

Art Unit: 1717

(d) J.Y. Kang, "A Review of the Emerging Nanotechnology Industry: Materials, Fabrications, and Applications," Department of Toxic Substances Control, [online] September 2010. [retrieved on 2010-09-27]. Retrieved from the Internet: <URL:http://www.dtsc.ca.gov/TechnologyDevelopment/Nanotechnology/upload/Review_of_Emerging_Nanotech_Industry.pdf >.

Thus, the claim limitation "cage molecules consisting of carbon atoms" **did not encompass carbon nanotubes at the time of the effective filing date of the instant application**, which is September 10, 1990 [see 1987 journal article by Dr. Harold Kroto ("The stability of the fullerenes C_n , with $n=24, 28, 32, 36, 50, 60$, and 70 ," Nature, vol. 329, pp. 529-531, 1987) that refers to cage molecules consisting of carbon atoms as "fullerenes"]. Furthermore, the claim limitation "cage molecules consisting of carbon atoms" presently **does not encompass carbon nanotubes** as evidenced by the literature articles cited above illustrating the state of the art. It is clear from the cited scientific literature that one of ordinary skill in the art would not consider carbon nanotubes to be encompassed by cage molecules consisting of carbon atoms; carbon nanotubes are regarded as tubes or cylinders and not cages.

There is inconclusive evidence regarding the existence of C_{60} or C_{70} in nature

With respect to the existence of C_{60} or C_{70} in nature, there is no conclusive evidence of record to support their existence in nature at this point. After further consideration by the examiner, Fang et al. and Osawa et al., that were used to reject claims 128 and 132 under 35 U.S.C. § 101 in the June 23, 2010 final Office action, do not provide conclusive evidence for the existence of C_{60} or C_{70} in nature. There is

Art Unit: 1717

evidence to the contrary regarding the existence of C_{60} and C_{70} in nature. Specifically, Liang et al. ("Primary Investigation of the Possible Occurrence of Geological Fullerene (C_{60}) in the Coal Seams and Their Wall Rocks Located in Lufeng of Southwestern China," Acta Petrologica Sinica, 18(3), pp. 419-423 (2002)) states that in 1999, Osawa came to Yunnan, China, after much interest was generated from the 1997 report by Fang et al. of the possible occurrence of C_{60} in coal from this region, to collect samples of coal and that no C_{60} was detected from this batch of samples (see page 3 of English translation of article).

Rietmeijer (Rietmeijer, Frans, ed. Natural Fullerenes and Related Structures of Elemental Carbon (Developments in Fullerene Science), Netherlands, Springer, 2006) provides a summary of the state of knowledge of natural fullerene occurrences. The back cover of Rietmeijer's book states that "[t]he existence of natural fullerene is at best contested and incompletely documented" and that "realistically it is still controversial."

Taylor et al. ("There Are No Fullerenes in the K-T Boundary Layer," Fullerene Science and Technology, 8 (1&2), pp. 47-54 (2000)) states that there are no fullerenes in the K-T boundary layer and that "[t]he absence of fullerenes in both the K-T layer and Shungite deposits in Russia...further reduces the probability of finding naturally occurring terrestrially-formed fullerenes." Taylor et al. further cautions (see page 53) that his work "highlights the need to support conclusions of a controversial nature with rigorous experimental work" and that "[t]his is particularly important when incorrect results become established, as in this case, as 'fullerene folklore.'"

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on M-F 9:30-6. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1717

ABSTRACT

C₆₀ and C₇₀ carbon atom compounds are prepared by evaporating graphite in an inert quenching gas. The vapor of carbon is collected and is selectively extracted with an organic non-polar solvent.